REMARKS

Status

This is responsive to the Office Action dated August 18, 2009, in which Claims 1-15, 17-28, 30 and 31 are rejected. Claims 1, 11, 27 and 31 have been amended. No claims have been added, and no claims have been canceled. Accordingly, Claims 1-15, 17-28, 30 and 31 are pending in the application, and are presented for reconsideration and allowance.

Claim Rejection – 35 USC 103 – Independent Claims 1, 11, 27 and 31

Claims 1-15, 17-28, 30 and 31 stand rejected under 35 USC 103 as being unpatentable over US Patent No. 6,608,942 (Le), US Patent Appl. No. 2003/0023150 A1 (Yokoi) and US Patent No. 6,181,810 (Zhang). This rejection is respectfully traversed.

Claim 1 of this application calls for:

correcting brightness of the in vivo images in other areas due to under exposure while maintaining an original brightness range for the detected edge like crease anatomical structures that are spatially unchanged

That is, brightness range is maintained.

In response to this feature, as a basis for the rejection, the Action asserted:

Additionally, Le does not provide from the case where edge data is modified for smoothing but not for intensity as Le provides for both smoothing and normalization of the data in the detected edge. Attention is paid to the teaching reference to Zhang for the purpose of showing that in the same area of endeavor, multiple mask sets can be formulated and applied to filtering operations in order to preserve features such intensity in some regions, while normalizing or otherwise modifying those features in another region of a medical image (Col 2, lines 30-Col 3 Line 25). Specifically when a substantial amount of speckle or discontinuous pixilation occurs (Col 3 Line 30-Col 4 Line 15) (See Action, page 4, bold emphasis supplied)

This assertion by the Examiner is respectfully traversed.

The text of Zhang noted by the Examiner calls not for maintaining features but suppressing them, in particular:

> Referring to the flow chart of FIG. 2A in connection with FIG. 1, the process to generate a blood speckle reduction frame includes two major steps: (See Zhang Col 2, lines 54-56)

> For each pixel intensity I(r, .theta.) in the current frame (in this example, the center frame, Frame 8), if the pixel intensity is larger than a preset value T1, it is tentatively considered to be non-blood (tissue), and value 0 is assigned to the corresponding pixel. (See Zhang Col. 3, lines 2-6)

> The next steps (comprising Step B) yield the so-called filtered frame, wherein each pixel value in the output is derived from the following: for every point M(r, .theta.) in M, if its value is 1 (Step S), this point is characterized as blood and needs to be suppressed. For example, the corresponding point in the output is set to the minimum value of I(r, .theta.) in all frames or subset of frames (e.g., 5 frames) (Step T). Otherwise, for a tissue point, where the value is 0, an average of the original intensity value and the intensity of the same point in the previous output frame can be used as the output value (Step U). (See Zhang Col. 4, lines 4-14)

This theme of not maintaining but rather suppressing information is found throughout Zhang. In particular:

> What is needed is a near real-time technique for suppression of spurious dynamic artifacts. (See Zhang Col. 1, lines 39-48)

> The degree of blood speckle suppression can be determined based on the actual values of the pixels at the same spatial location in given frames. (See Zhang Col. 1, lines 61-65)

And of particular note, the idea of suppressing intensity is part of the Zhang claimed feature "suppressing intensity values of blood region pixels" and "averaging over time and space intensity values of non-blood region pixels" as recited in Claim 3 (see Zhang col. 4, lines 65-67). It is submitted that, like suppressing, averaging also does not maintain values. This suppression of intensity values is also in other claims of Zhang (see Zhang Claims 5, 12, 13, 16, 20 and 26).

As noted above, independent Claim 1 calls for maintaining an original brightness range which is submitted is not taught or suggested by Zhang (or Le and Yokoi). It is submitted that Claim 1 distinguishes over Lee, Yokoi and Zhang.

The remaining independent claims also emphasize the maintaining ("maintaining an original brightness range" - Claims 11, 27 and 31).

Withdrawal of the rejection is requested on this basis.

Even if the Action is assumed, for arguments sake, to be correct about the prior art and maintaining a brightness range, the claims still distinguish over the prior art. In particular, the claims emphasize that the shape of the edges of the creases are unchanged or remain spatially unchanged ("edge like crease anatomical structures that are spatially unchanged" – Claim 1). In contrast, as discussed below the prior art changes the shape. The claims have been amended to clarify this feature, "edge like crease anatomical structures that are spatially unchanged in shape" - Claim 1, emphasis added.

In Le's method (see steps 668 and 672 in Fig. 6C, and steps 1106 and 1108 in Fig. 11), one of the consequences of the action "edge data being modified for intensity and smoothing functions" is that it "Sets the edge site as being OFF", which means that the brightness of the edge pixel is changed from either black to white or white to black and the edge pixel is completely removed. That is, the original edge is not preserved, and the edge is spatially changed.

Here is an example: an edge detected (that is, an original edge, not processed yet):
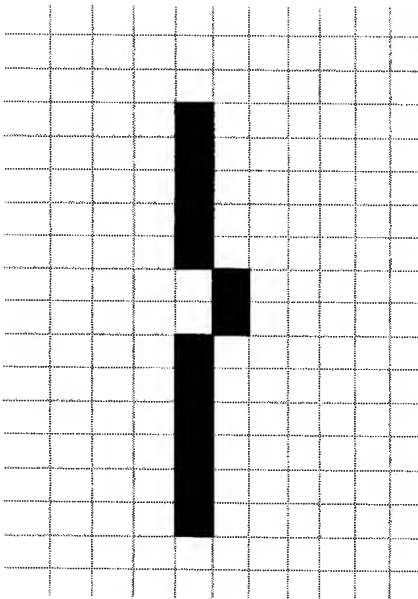
After applying Le's method, the edge could be spatially changed to
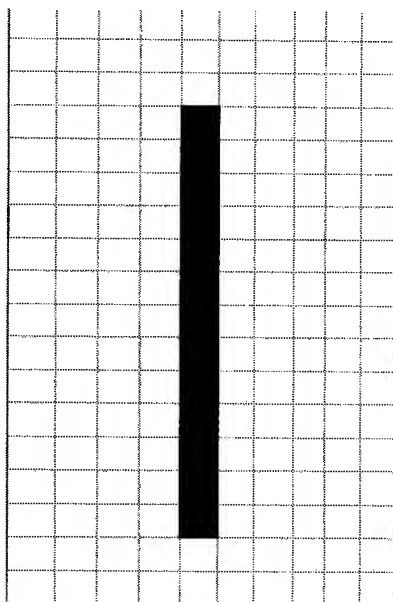
Also see the example of Le's teaching, Column 6, lines 1-3, and FIGs 22A and 22B.

The Action states, on page 5, "It would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated the teachings of Zhang with those of Le and Yokoi et al for the purpose of facilitating a multiple feature-based filters for regions of patient images". Even if the

combination can be made as proposed by the Examiner, to which Applicants do not agree, Le describes a method in which the edge is spatially changed; incorporating Zhang's method with the teachings of Le and Yogoi does not change the fact that the edge in the combination is spatially changed.

The remaining independent claims also emphasize the spatially unchanged shape.

For this additional reason it is submitted that the independent claims distinguish over the prior art.

As to the Action's position regarding maintaining a brightness range, it is submitted that the prior art is teaching away from the invention of Claim 1 because it teaches the opposite of the claim. In particular, the target region in the prior art is suppressed while the non-target region is not suppressed, where the opposite happens to the target region of the invention of Claim 1. Zhang discusses an approach where a target region, which is a blood speckle region, is detected, the intensity values in the detected target region are suppressed and in the non-target region averaging of the intensity values occurs. In contrast, Claim 1 calls for the target region ("the detected edge like crease anatomical structures") to be maintained in brightness range ("maintaining an original brightness range for the detected edge like crease anatomical structures").

For this further reason it is submitted that the independent Claims distinguish over the prior art.

Claim Rejection - 35 USC 103 - Dependent Claims

The dependent Claims 2-10, 12-15, 17-26, 28 and 30 depend from the above-discussed independent claims and are patentable over the prior art for the reasons discussed above. The dependent claims also recite additional features not taught or suggested by the prior art.

A point that the Action does not appear to address involves edge pixels in Le. In Le's method (see steps 668 and 672 in Fig. 6C, and steps 1106 and 1108 in Fig. 11), one of the actual consequences of the action "edge data being modified for intensity and smoothing functions" is that it "Sets the edge site as being OFF", which means that the brightness of the edge pixel is changed from

either black to white or white to black and the edge pixel is completely removed. That is, the original edge is not preserved (or maintained), and the edge is spatially changed.

In contrast, Claims 3 and 10 do not remove edge pixels, rather, these claims maintain the edge pixels (boundary pixels) in the original brightness range ("maintaining an original brightness range" - Claim 3 and Claim 10). None of the edge pixels is set as being OFF (meaning that the brightness of the edge pixel is changed from black to white or from white to black). In other words, the Claims 3 and 10 do not involve removing edge pixels, therefore, the edge is spatially unchanged in shape. That is, Claims 3 and 10 further emphasize that the edge like crease anatomical structures are spatially unchanged in shape.

As noted above, the Action states, on page 5, "It would have been obvious to one of ordinary skill in the art at the time of the invention to have incorporated the teachings of Zhang with those of Le and Yokoi et al for the purpose of facilitating a multiple feature-based filters for regions of patient images". As discussed above, Le teaches a method in which the edge is spatially changed; incorporating Zhang's method with the teachings of Le and Yogoi does not change the fact that the edge is spatially changed. Since Le's method detects the edge and changes the edge shape, no matter what Zhang's method does, the edge does not keep the original shape.

The combinational result may look like this as an illustration:
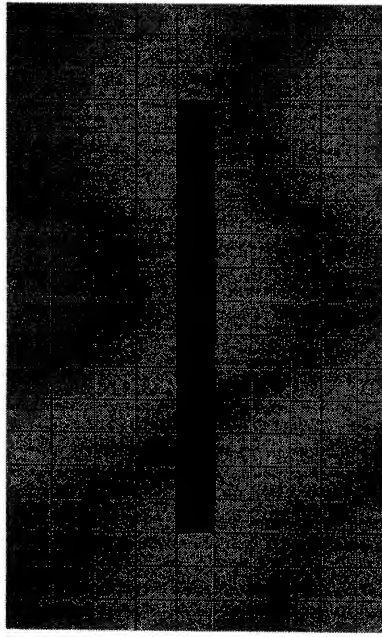
That is, the prior art changes the shape of the edge whereas the claims invention keeps the shape unchanged. For this additional it is submitted that the dependent claims are allowable over the prior art.

Further, as noted in the previously filed Amendment, Claim 20, in association with detecting of areas where light does not reach directly, calls for "forming a skeleton image of the threshold image; and testing the skeleton image for one or more areas where light rays are unable to reach directly". The Examiner has not pointed to anything in the prior art that teaches or suggests this. Indeed, none of Le or Yokoi or Zhang even mention skeletons much less testing skeleton images.

The Examiner is specifically respectfully requested to address the features of Claim 3, 10 and 20 if the rejection thereof is maintained.

Nothing has been found in the prior art that teaches or suggests this. Accordingly, it is submitted that the dependent claims are independently patentable over the prior art.
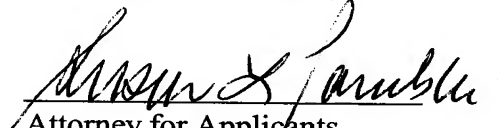
Summary

Should the Examiner consider that additional amendments are necessary to place the application in condition for allowance, the favor is

requested of a telephone call to the undersigned counsel for the purpose of discussing such amendments.

       For the reasons set forth above, it is believed that the application is in condition for allowance. Accordingly, reconsideration and favorable action are respectfully solicited.

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Respectfully submitted,

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If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Carestream Health, Inc. at 585/627-6687 or 585/627-6740.